

REMARKS

Upon entry of the Amendment, Claims 4-5 and 25-31 are pending in the application.

Claims 1-3 and 20 were previously canceled for purposes of advancing prosecution, without acquiescing to the propriety of the Examiner's rejections against these claims. New Claims 28-31 are added based on the same subject matter of the previously canceled claims. Entry of the Amendment is respectfully requested.

Claims 6-19 and 21-24 were previously canceled without prejudice. These claims were originally withdrawn from consideration by the Examiner.

Reconsideration and review of the claims on the merits are respectfully requested.

Claim Rejections - 35 U.S.C. § 112

Claims 4-5, 25-27 are rejected under 35 U.S.C. 112, second paragraph, as assertedly being indefinite, for the reasons given in the Office Action.

The Examiner rejects Claims 4 and 27 because, e.g., it is assertedly unclear what "multiplied laminated structure" encompasses, asking "[d]oes this mean 1 or more times? 2 or more times?"

The Examiner rejects Claim 5 because, e.g., it is assertedly unclear what "a multilayered alternating laminated structure" encompasses, asking "[d]oes this mean 1 or more times? 2 or more times?"

The Examiner rejects Claim 25 because, e.g., it is assertedly unclear if the step of forming by a vacuum film growth method is a method step.

The Examiner rejects Claim 26 because it is assertedly unclear what is meant by "comprising a lithium layer including therein".

Applicants respond as follows.

Claims 4-5 and 25-27 have been amended as shown in the Amendments to the Claims to clarify informalities.

Furthermore, Applicants submit that the phrase "multiplied laminated structure" in Claims 4 and 27 and the phrase "a multilayered alternating laminated structure" in Claim 5 are clear to one skilled in the art, as written. However, in order to advance prosecution, Applicants amend Claims 4 and 27 to recite "multilayered alternating laminated structure", consistent with the recitation in Claim 5. Applicants point to the specification, for example, at page 18, lines 20-23 (see also Eleventh Embodiment, page 35, lines 3-18), describing that there must be at least two laminations each of the lithium layer and the metal fluoride layer in order to achieve sufficient dendrite suppression. In other words, a multilayered structure of one lithium layer and one metal fluoride layer is not encompassed by Claims 4, 5 and 27.

As amended for clarification without limiting the scope of the claim, Claim 25 is a method claim with at least one claimed step of forming an anode. Thus, Applicants' submit that the claim is fully in compliance with 35 U.S.C. § 112, second paragraph as written.

Claims 4-5 and 25-27 now more clearly satisfy the requirements of 35 U.S.C. § 112, second paragraph.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, second paragraph.

Claim Rejections - 35 USC § 102 and §103

A. Claims 5 and 27 are rejected under 35 U.S.C. §102(b) as assertedly being anticipated by Katsumata (JP 8-250,108, abstract) or Kawakami et al. (5,641,591).

The Examiner cites Katsumata as teaching a metal foil consisting of a metal lithium or lithium-aluminum alloy which constitutes a negative electrode which is left under an argon gas atmosphere containing a small amount of hydrogen fluoride or hydrogen chloride to form a lithium fluoride film on the metal foil surface.

The Examiner cites Kawakami et al. as teaching that in order to prevent the growth of lithium dendrite, it is considered that to eliminate or minimize the formation of the uneven insulating coating film is effective. In order to attain this situation, a surface of an anode comprised of a lithium foil is covered with an insulating film comprising lithium carbonate, lithium hydroxide or lithium fluoride. Since there is no water present in this reaction, then inherently “no lithium hydroxide or lithium oxide film” would be formed.

B. Claim 5 is rejected under 35 U.S.C. §102(b) as assertedly being anticipated by Kawai (JP 7302617, abstract).

The Examiner cites Kawai as teaching a battery comprising a negative electrode made of at least one of a lithium alloy where the negative electrode has on its surface a film containing lithium fluoride.

C. Claim 4 is rejected under 35 U.S.C. 102(b) as assertedly anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Katsumata (JP 8-250108, abstract) or Kawakami et al. (5,641,591), for the reasons of record.

The Examiner asserts that in the event any differences can be shown for the product of the product by process claim 4, as opposed to the product taught by Katsumata or Kawakami et al., such differences would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results.

Applicants respond as follows.

As previously described, Claims 4-5 and 25-27 are amended for clarification.

Applicants emphasize that in Claims 4-5 and 27, a “multilayered alternating laminated structure” is required, and submit that none of the references individually or in combination thereof disclose or teach at least this element of the inventions of these claims.

Furthermore, Applicants point out that in the Office Action mailed January 28, 2004, Claim 5 was originally allowed. Applicants note that the reference to Kawai was previously applied against the present invention in the Office Action mailed August 25, 2003, and subsequently withdrawn by the Examiner in the Office Action mailed January 28, 2004. Thus, Applicants incorporate by reference the Remarks provided in the Amendment under 37

C.F.R. §1.111 filed on November 25, 2003, and note that the Examiner properly responded to Applicants' remarks against Kawai at that time by allowing Claim 5. No additional basis in Kawai appears to be set forth in the present Office Action.

In the Office Action mailed October 22, 2004, Claims 4-5 and 25 were allowed, and Claims 26-27 were objected to. Applicants note that the reference to Katsumata was previously applied against the present invention of Claims 1, 2, 20 (previously canceled) and pending Claim 25, but not Claims 4-5 (or Claim 27, which was not pending at the time), in the Office Action mailed January 28, 2004, and subsequently withdrawn by the Examiner in the Office Action mailed May 21, 2004. Thus, Applicants incorporate by reference the Remarks provided in the Amendment under 37 C.F.R. § 1.111 filed on April 16, 2004, and note that the Examiner responded to Applicants' remarks against Katsumata (regarding pending Claim 25) by withdrawing the rejection over Katsumata, in favor of a new rejection under 35 U.S.C. § 112, eventually allowing Claim 25. No additional basis in Katsumata appears to be set forth in the present Office Action.

Regarding Kawakami, Applicants emphasize that no citation within Kawakami is given for Applicants' "multilayered alternating laminated structure". Furthermore, the only citation given at column 6, lines 4-18, does not reflect support for the Examiner's assertion that "[s]ince there is no water present in this reaction than inherently [sic] 'no lithium hydroxide or lithium oxide film' would be formed." (Office Action, page 2, last paragraph). Instead, when taken in context within the preceeding and following paragraphs, it is evident that the cited passage does

not teach Applicants' invention, as lines 19-20 reflect that "these manners [e.g., completely removing lithium hydroxide] are not practically employable...".

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. § 102(b) or under 35 U.S.C. § 103(a).

New Claims 28-31

New Claims 28-31 reinstate the subject matter of canceled Claims 1-3 and 20. Previously, the following rejections were applied against Claims 1-3 and 20. Thus, Applicants proceed as if these same rejections would be applied against new Claims 28-31.

A. Claims 1-2 were previously rejected under 35 U.S.C. § 102(b) as assertedly being anticipated by Nakagiri et al. (JP 11-288706, machine translation) for the reasons given in the Office Action.

The Examiner cites Nakagiri et al. as teaching that a lithium foil was coated with LiF and LiCl, and that the negative electrode charge collector uses expanded metal made from nickel.

B. Claims 3 and 20 were rejected under 35 U.S.C. § 102(b) as assertedly being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Nakagiri et al. for the reasons given in the Office Action.

The Examiner states that in the event any differences can be shown for the product of the product by process Claim 3, as opposed to the product taught by Nakagiri et al., such differences would have been obvious to one of ordinary skill in the art as a routine modification of the

product in the absence of a showing of unexpected results, and further states that the determination of patentability is based upon the product itself, not upon the method of its production.

In response to Applicants' arguments filed on August 20, 2004, the Examiner states that "Nakagiri et al. teaches that dendrite precipitation reaction of the lithium metal as the active metal can be inhibited. Thus teaching that lithium hydroxide or lithium oxide film is [*sic*- not] formed."

Applicants respectfully submit that new Claims 28-31 are patentable over Nakagiri et al.

Nakagiri et al. does not anticipate or render obvious each and every requirement of at least Applicants' independent Claims 28 and 30. Nakagiri et al. does not disclose, teach or suggest, for example, "said anode...wherein said lithium layer has substantially no lithium hydroxide or lithium oxide film or the like on the surface thereof", or, for example, "said anode...wherein said lithium layer and said metal fluoride substance layer are formed by a vacuum film growth method".

Nakagiri et al. was disclosed in the present specification as being inferior technology, distinguishable from the present invention. In the specification at the bridging paragraph of pages 4-5, Applicants describe the Japanese Un-Examined Patent Publication No. 11-288706, as disclosing a past improvement in the cycle life of a battery, by forming a surface covering film having as a main component a rock-salt type crystal structure, on the surface of a lithium sheet oriented with preference to a uniform crystal structure, thereby enabling suppressing a dendrite

precipitation reaction of the metallic lithium. This disclosure mentions that it is preferable that the substance used as a surface covering film be selected as at least one lithium halide, selected from among LiCl, LiBr, and LiI. In this case, in order to form a solid solution covering film of at least one of LiCl, LiBr, and LiI and LiF, a lithium sheet formed by *pressuring (cold rolling)* and oriented preferably on the crystal plane is immersed in a dielectric fluid containing at least one of a sodium molecule or sodium ion, a bromine molecule or bromine ion, and an iodine molecule or iodine ion with a fluoride molecule or fluoride ion. This technology makes use of a cold-rolled lithium sheet, and because it is easy to expose the lithium sheet to the atmosphere, there is a tendency for a covering film to be formed on the surface due to water content and the like, leading to non-uniformity in the activated points, making it impossible to achieve the intended stable covering film and causing insufficient suppression of dendrite growth. In other words, *relative* inhibition of dendrite formation reaction of the lithium metal, which is a beneficial characteristic in its own right, does not necessarily prevent the lithium layer from having substantially no lithium hydroxide or lithium oxide film or the like on its surface. Thus, Nakagiri fails to anticipate this element of the claimed invention. Furthermore, Nakagiri fails to disclose or teach a vacuum film growth method which would prevent the formation of a lithium hydroxide or lithium oxide film on the lithium layer of the anode.

Additionally, because of the immersion into an electrolytic fluid, the same problems arise as noted with regard to the Japanese Un-Examined Patent Publication No. 7-302617, cited on pages 2-3 of the present specification. Because of the use of a cold-rolled lithium sheet,

compared with the case of using an amorphous lithium layer, there is a greater tendency toward dendrite formation, leading to possible insufficient cycle life.

Thus, although the Examiner recognizes that determination of patentability of product-by-process claims are based on the product itself, Applicants submit that independent Claims 28 and 30 contain express or implied structural distinctions with Nakagiri such that these are not substantially similar products. That is, Claim 28 recites, for example, “said anode...wherein said lithium layer has substantially no lithium hydroxide or lithium oxide film or the like on the surface thereof”. This is at least one clear structural distinction from Nakagiri’s disclosure and teachings despite the Examiner’s cursory conclusion in the Office Action mailed October 22, 2004, that “Nakagiri et al. teaches that dendrite precipitation reaction of the lithium metal as the active material can be inhibited. Thus teaching that lithium hydroxide or lithium oxide is [*sic* - not] formed.” (page 2, paragraph 1).

As well, Claim 30 recites, for example, “said anode...wherein said lithium layer and said metal fluoride substance layer are formed by a vacuum film growth method”. This process step implies at least a structure where the lithium layer distinctively lacks, or inhibits the growth of, a lithium hydroxide or lithium oxide film or the like on its surface. This distinctive structural characteristic, and its associated benefits, imparted by the claimed vacuum film growth method is not obvious from the prior art. MPEP §2113 gives guidance to the Examiner that the structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be

expected to impart distinctive structural characteristics to the final product. See also, *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979).

The present invention is distinguished from the structure of Nagakiri's faulty process. In the present invention, there is no lithium hydroxide or lithium oxide film or the like on the surface thereof, as occurred in the prior art. Additionally, because a metal fluoride layer is formed on the lithium layer without losing the vacuum condition, good amorphous properties are achieved, and an anode is obtained which has covering film made of a metal fluoride. (See page 10, lines 13-21 and Comparison Example 2, where a lithium layer was cold-rolled, page 29)

The present inventions provide solutions for the problems described above in a lithium secondary cell with an anode having a lithium layer containing a film of metallic lithium or alloy thereof, formed by a vacuum film growth method (Claim 30) or having substantially no lithium hydroxide or lithium oxide film or the like on the surface (Claim 28), where the anode contains therein a metal fluoride layer comprising at least one metal fluoride substance. These lithium secondary cells feature suppressed dendrite growth in an anode, which contains a metallic lithium or an alloy thereof, and feature superior energy density, superior electromotive force, and superior cycle life.

Claims 29 and 31 depend upon independent Claim 28 and are patentable for at least the same reasons as given for the patentability of Claim 28 above.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 09/985,852

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Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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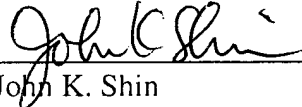
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